farm machinery costs as a guide to custom rates

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PREFACE

As the demand for custom work increases, farmers in Alberta continue to seek information on machinery costs and custom rates. Custom operators want to ensure they are charging enough to cover their costs and farmers hiring custom operators are concerned that a fair price is paid for the work being done.

Since 1975, Alberta Agriculture has annually published this guide to machinery costs. This publication provides current machinery cost information as a basis for negotiating fair custom rates for farm machinery operations. It is also a useful guide to budgeting machinery costs for other purposes. The best decision information, however, is the actual costs for your specific machine. Because of the variability in machinery cost between farms, we strongly urge use of the worksheets (on page 13 and 14) to calculate these costs for your decision.

A custom operator's costs are only one side of the negotiations. Market rates for the 1983 season provide a second reference point. Some alternative approaches to using this information are suggested on page 1. Some points to consider in custom hiring agreements are listed on page 12.

It is difficult to accurately estimate the replacement cost of machines since creative pricing programs at most dealers tended to obscure the real capital cost of equipment. New machine prices are generally 5%-10% higher than 1983. Operating costs and interest rates have remained relatively constant. Consequently, the projected costs for owning and operating equipment in 1984 are higher than in 1983 due to slightly higher capital costs.

We gratefully acknowledge the services of Cal Ausenhus who again conducted the machinery cost survey. Paul Gervais, Gerd Andres and Keith Brown from the Farm Business Management Branch of Alberta Agriculture also contributed to updating this publication. The Market Rate Survey data was provided from a joint-project with Statistics Branch.

We draw your attention to the yellow brochure in the centre of this publication. This year, we have introduced a publication titled "Directory of Custom Operators In Alberta 1984". Our plan is to prepare a similar Directory of Custom Operators for 1985. Your cooperation in contributing to this directory will be appreciated.

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TABLE OF CONTENTS

INTRODUCTION 1

TRACTORS - 2 WHEEL DRIVE 3

TRACTORS - 4 WHEEL DRIVE 4

CULTIVATION EQUIPMENT 5

SEEDING AND SPRAYING EQUIPMENT 6

FORAGE EQUIPMENT 7

COMBINES - SELF PROPELLED & PULL TYPE 9

GRINDERS, MIXERS & DRYERS 10

FARM TRUCKS 11

POINTS TO CONSIDER IN A CUSTOM HIRING AGREEMENT 12

MACHINERY COST WORKSHEET 13

MACHINERY CUSTOM CHARGE WORKSHEET 14

FUEL CONSUMPTION FOR VARYING TRACTOR HORSEPOWER 15

MACHINERY COSTS ASSUMPTION GUIDE 16

"MY EQUIPMENT COSTS" 17

INTRODUCTION

Custom charges for farm operations can be arrived at in two ways:

1) Use the going rate for the job. The commercial market rates are surveyed and reported continuously by the Farm Business Management Branch. Relevant 1983 figures are listed in the "Market Rate" column of the cost tables in the text.

OR

2) Set the rate at a level such that some or all of the costs plus profit are covered.

This publication outlines steps in the buildup of costs incurred by some of the machinery units used in field and livestock operations. These costs are accumulated into a Full Cost + Profit Basis for a custom charge.

ASSUMPTIONS

1) Estimated years of life, annual hours of use and annual repair rates are specified for each class of machine.
2) Interest on average machine investment is charged at 13% per year.
3) Diesel fuel is charged at $.30 per litre, purple gas at $.31 per litre and propane at $.20 per litre.
(Changes in diesel and propane prices can be costed from the litre per hour usage estimates, then applied to total cost per hour).
4) Labor is charged at $7.50 per hour.
5) Profit allowance on tractors only is calculated at 30% of variable cost.
6) Profit allowance on Self-Propelled Machines and Tractor plus Implement Units equals 40% of the sum of variable costs **plus** labor.
7) Calculations follow the procedures and assumptions of the worksheets included on pages 13 and 14.

FIXED COSTS

Hours of annual use have a major effect on fixed costs per hour. Three levels of annual use are listed for tractors and combines, so as to guide realistic custom or rental pricing.

The tractor costs associated with a 600 hour annual use are used in costing out all tractor driven operations. Substitute the 400 or 1000 rates if they are more applicable.

If your annual use figures differ greatly from those listed, use this formula to adjust your Fixed Costs (FC) Per Hour: Your FC/Hr =

$$\frac{\text{Quoted FC/Hr x Quoted Annual Use In Hrs.}}{\text{Your Annual Use In Hrs.}}$$

HOW TO USE THE GUIDE

1) If you are a **full-time custom operator**, then use the Full Cost + Profit Basis for estimating a charge. Be sure to adjust fixed costs if your annual hours of use differ much from those quoted. The profit margin can be adjusted to meet the market conditions.

2) If you are doing custom work on a **good neighbor payment basis**, then fixed costs of owning the machine may be ignored since they represent an annual cost incurred whether or not custom work is done. However, the rate should cover all variable costs which include an allowance for repairs. Labor and profit margin can be adjusted to meet each situation.

3) If you plan to do custom work in addition to your own work, so as to partly justify ownership of a larger machine, then the custom charge should cover variable costs, labor, a profit margin **plus** a proportion of fixed costs calculated as follows:

Proportion of Fixed Costs =

$$\frac{\text{Hours of Custom Work}}{\text{Total Annual Hours of Use}} \times \text{Total Fixed Costs}$$

4) If you are renting out machinery, then you will wish to at least cover fixed costs and those variable costs such as lubrication and repairs which may not be already covered by the renter.
5) If you wish to assess a rate for a full operation such as silage making, which requires several machines, then add the hourly costs of each activity, making sure that there is neither omission nor duplication of men and units. Use worksheets on page 13 and 14.
6) The purchase cost estimates are based on average list prices less 10% as of February, 1984 for each class of machine. These represent current **replacement** costs which should be budgeted and charged for, even if you do custom work with older machines, unless the older machine will not do a comparable job.

OTHER CONSIDERATIONS

1) **Favorable or unfavorable working conditions** such as size of job, distance, access, contour, soil type and possible down time, must modify the guide figures. **Per hour** charges allow for some of these situations.
2) Charges per unit of output such as per acre, per bushel or per bale, defined on **work rates per hour**, may be quite different from those quoted. **Per hour charging** overcomes some of these uncertainties.
3) You can adjust the labor charge according to your actual cost of hired work or the opportunity cost of your own labor.
4) If your experience and farm records suggest that other costs and assumptions would suit your situation, then recalculate using the worksheets.
5) **Earlier and faster may be cheaper.**
There are $ penalties attached to late completion of operations. The $ rewards for timely quality work, quickly completed by large machines, is only earned if the support system, including seed and fertilizer supplies and grain trucking, is well organized.
6) Custom hiring is a business arrangement between two parties. Misunderstandings can be avoided by following the guidelines in page 12.

Such factors as tax and equity in farm machinery influence costs, but are not considered here.

OTHER INFORMATION SOURCES

Farm Machinery Costs, Alberta Agriculture, Agdex 825-2, March 1980.
Planning Farm Machinery Costs, Alberta Agriculture, Agri-Fax Leaflet, Agdex 825-5, August 1977.
Fundamentals Of Machine Operation - Machinery Management, John Deere Co., Illinois, 1975.
U.G.G. Grain Growers Manual, Engineering Section.
Know Your Farm Machinery Cost, Alberta Agriculture, Agdex 825-6, January 1984.
Custom Rates Annual Survey Summary - 1983, Alberta Agriculture, Agdex 825-9, February 1984.
Directory of Custom Operators in Alberta 1984, Alberta Agriculture, Agdex 825-17, March 1984.

TRACTORS - 2 WHEEL DRIVE (2WD)

Years Life = 13
Annual Use = 400, 600*, 1000
Annual Repair Rate = 3% Replacement Cost

2WD PTO HP	Annual Hours Use	Diesel Use	Current Replace Cost	Fixed Cost	Variable Cost (Labor Omitted**)	Total Cost	Profit Margin 30 % of Var. Cost	Cost + Profit Basis for Custom Charge	Mark Rat Surv
		litres/Hr	$	$/Hr	$/Hr	$/Hr	$/Hr	$/Hr	19
40	400	8	18000	6.78	3.66	10.44	1.10	11.54	
	600			4.52		8.18		9.28	
	1000			2.71		6.37		7.47	
60	400	13	23000	8.67	5.64	14.30	1.69	15.99	$.19 - .
	600			5.78		11.41		13.10	per
	1000			3.47		9.10		10.79	PTO HP/
80	400	17	30000	11.30	7.37	18.67	2.21	20.88	
	600			7.54		14.90		17.11	
	1000			4.52		11.89		14.10	
100	400	22	50000	18.84	10.09	28.93	3.03	31.96	
	600			12.56		22.65		25.68	
	1000			7.54		17.63		20.65	
120	400	28	55000	20.73	12.41	33.14	3.72	36.86	
	600			13.82		26.23		29.95	
	1000			8.29		20.70		24.42	
140	400	32	61000	22.99	14.09	37.08	4.23	41.30	$.18 - .
	600			15.32		29.41		33.64	per
	1000			9.19		23.28		27.51	PTO HP/
160	400	38	68000	25.62	16.51	42.13	4.95	47.09	
	600			17.08		33.59		38.55	
	1000			10.25		26.76		31.71	
180	400	39	73000	27.51	17.11	44.61	5.13	49.74	
	600			18.34		35.44		40.58	
	1000			1.00		28.11		33.24	

* The 600 Hour Annual Use figure is the typical figure and the basis used for costing tractor-driven operations.

** To avoid duplication, **labor is not charged in the tractor cost calculation.** Labor is included in the cost of tractor plus implement and self-propelled operations listed on pages 5 to 11.

ars Life = 13
nual Use = 400, 600*, 1000
nual Repair Rate = 3% Replacement Cost

TRACTORS - 4 WHEEL DRIVE (4WD)

4WD Engine HP	Annual Hours Use	Diesel Use	Current Replace Cost	Fixed Cost	Variable Cost (Labor Omitted**)	Total Cost	Profit Margin 30 % of Var. Cost	Cost + Profit Basis for Custom Charge	Market Rate Survey
		litres/Hr	$	$/Hr	$/Hr	$/Hr	$/Hr	$/Hr	1983
	400			25.25		40.33		44.85	
175	600	34	67000	16.83	15.08	31.91	4.52	36.44	
	1000			10.10		25.18		29.70	
	400			30.15		47.95		53.29	
220	600	40	80000	20.10	17.80	37.90	5.34	43.24	
	1000			12.06		29.86		35.20	
	400			33.16		54.81		61.31	
250	600	50	88000	22.11	21.65	43.76	6.50	50.25	
	1000			13.26		34.91		41.41	
	400			39.57		63.10		70.16	$.19 - .21
275	600	53	105000	26.38	23.54	49.91	7.06	56.97	per
	1000			15.83		39.36		46.42	PTO HP/HR
	400			43.34		69.10		76.82	
300	600	58	115000	28.89	25.76	54.65	7.73	62.38	
	1000			17.33		43.09		50.82	
	400			47.10		74.74		83.04	
350 ***	600	62	125000	31.40	27.64	59.04	8.29	67.33	
	1000			18.84		46.48		54.77	
	400			56.52		93.35		104.40	
450 ***	600	85	150000	37.68	36.83	74.51	11.05	85.56	
	1000			22.61		59.43		70.48	

* The 600 Hour Annual Use figure is the typical figure and the basis used for costing tractor-driven operations.

** To avoid duplication, **labor is not charged in the tractor cost calculation.** Labor is included in the cost of tractor plus implement and self-propelled operations listed on pages 5 to 11.

*** Priced without PTO.

CULTIVATION EQUIPMENT

Years life = 15

Implement	Tractor HP	Current Replace Cost	POWER UNIT OR SP UNIT Fixed Cost	POWER UNIT OR SP UNIT Variable Cost	IMPLEMENT Fixed Cost	IMPLEMENT Variable Cost	TOTAL Machine Cost	Profit Margin 40%(Var Costs + $7.50 Labor)	Full Cost + Profit Basis for Custom Charge *			Market Rate Survey
		$	$/Hr	$/Hr	$/Hr	$/Hr	$/Hr	$/Hr	$/Hr	Ac/Hr	$/Acre	1983
PLOWS			Annual Hours Use = 150		Annual Repair Rate = 6% Replace Cost							
3 x 16" 3 Point	60	4500	5.78	5.64	4.25	1.80	17.46	5.97	30.93	2.00	15.47	$14-20 per Acre
5 x 16" Semi 3 pt	120	8500	13.82	12.41	8.02	3.40	37.65	9.32	54.47	3.00	18.16	
6 x 18" Trailing	140	11000	15.32	14.09	10.38	4.40	44.19	10.40	62.09	4.00	15.52	
8 x 16" Trailing	220	13000	20.10	17.80	12.26	5.20	55.36	12.20	75.06	6.00	12.51	
10 x 18" Trailing	250	15000	22.11	21.65	14.15	6.00	63.91	14.06	85.47	7.00	12.21	
HD CULTIVATORS W/ MTD HARROWS			Annual Hours Use = 250		Annual Repair Rate = 6% Replace Cost							
14' Single	80	6000	7.54	7.37	3.40	1.44	19.74	6.52	33.76	7.00	4.82	$3.85-$5.00 per Acre
22' Wing	120	10000	13.82	12.41	5.66	2.40	34.29	8.92	50.71	11.00	4.61	
31' Wing	160	14500	17.08	16.51	8.21	3.48	45.28	11.00	63.78	15.00	4.25	
42' Wing	220	19500	20.10	17.80	11.04	4.68	53.61	11.99	73.11	20.00	3.66	
60' Wing	350	26000	31.40	27.64	14.72	6.24	80.00	16.55	104.05	30.00	3.47	
FIELD CULTIVATORS W/ MTD HARROWS			Annual Hours Use = 250		Annual Repair Rate = 6% Replace Cost							
16' Single	60	7500	5.78	5.64	4.25	1.80	17.46	5.97	30.93	8.50	3.64	$2.70-3.50 per Acre
22' Wing	80	9500	7.54	7.37	5.38	2.28	22.56	6.86	36.92	12.00	3.08	
32' Wing	120	11500	13.82	12.41	6.51	2.76	35.50	9.07	52.06	17.00	3.06	
42' Wing	160	16000	17.08	16.51	9.06	3.84	46.49	11.14	65.13	22.00	2.96	
DISCS - TANDEM HD			Annual Hours Use = 150		Annual Repair Rate = 6% Replace Cost							
16' Single	100	9500	12.56	10.09	8.96	3.80	35.41	8.56	51.47	7.50	6.86	$5.50-$7.00 per Acre
24' Wing	140	22000	15.32	14.09	20.75	8.80	58.97	12.16	78.62	12.00	6.55	
30' Wing	220	24000	20.10	17.80	22.64	9.60	70.14	13.96	91.60	16.50	5.55	
16' Heavy Offset	140	15500	15.32	14.09	14.62	6.20	50.24	11.12	68.85	7.50	9.18	
ROTOVATORS			Annual Hours Use = 100		Annual Repair Rate = 6% Replace Cost							
5' Rotor	80	8000	7.54	7.37	11.32	4.80	31.02	7.87	46.39	1.50	30.93	$40 per Hour
6' Rotor	120	11000	13.82	12.41	15.57	6.60	48.39	10.60	66.50	2.50	26.60	

* Full Cost + Profit basis for Custom Charge. Includes Labor at $7.50 per Hour.

Implement	Tractor HP	Current Replace Cost $	POWER UNIT OR SP UNIT Fixed Cost $/Hr	POWER UNIT OR SP UNIT Variable Cost $/Hr	IMPLEMENT Fixed Cost $/Hr	IMPLEMENT Variable Cost $/Hr	TOTAL Machine Cost $/Hr	Profit Margin 40% (Var Cost + $7.50 Labor) $/Hr	Full Cost + Profit Basis for Custom Charge * $/Hr	Ac/Hr	$/Acre	Market Rate Survey 1983
V-BLADE	Life = 15		Annual Hours Use = 150			Annual Repair Rate = 6% Replace Cost						
21'	100	10000	12.56	10.09	9.43	4.00	36.08	8.64	52.22	11.00	4.75	$3.85-$4.75 per Acre
28'	160	12500	17.08	16.51	11.79	5.00	50.38	11.60	69.49	15.00	4.63	
42'	250	20000	22.11	21.65	18.87	8.00	70.62	14.86	92.98	20.00	4.65	
ROD WEEDER WITH MULTIPLEX & HARROW	Life = 13		Annual Hours Use = 150			Annual Repair Rate = 6% Replace Cost						
24'	100	8000	12.56	10.09	7.55	3.20	33.40	8.32	49.21	12.00	4.10	$2.70 per Acre
36'	120	11000	13.82	12.41	10.38	4.40	41.00	9.72	58.23	16.00	3.64	
48'	160	16500	17.08	16.51	15.57	6.60	55.76	12.24	75.50	25.00	3.02	
HARROWS	Life = 15		Annual Hours Use = 40			Annual Repair Rate = 2% Replace Cost						
Spring Tooth 50'	80	6000	7.54	7.37	21.23	3.00	39.13	7.15	53.77	35.00	1.54	$1.75-$2.50 per Acre
70'	120	8000	13.82	12.41	28.30	4.00	58.53	9.56	75.59	45.00	1.68	
Harrow Packers 40'	140	14000	15.32	14.09	49.53	7.00	85.94	11.44	104.88	25.00	4.20	
70'	180	19000	18.34	17.11	67.21	9.50	112.16	13.64	133.30	42.00	3.17	
SEED DRILLS	Life = 15		Annual Hours Use = 100			Annual Repair Rate = 2% Replace Cost						
Press Drills 12'	60	13500	5.78	5.64	19.10	2.70	33.22	6.33	47.05	5.50	8.55	$4.00-$6.00 per Acre
End Wheel 12'	60	8000	5.78	5.64	11.32	1.60	24.33	5.89	37.73	5.50	6.86	
Hoe Drill 14'	60	13500	5.78	5.64	19.10	2.70	33.22	6.33	47.05	6.00	7.34	
Zero/Min. Till 12'	60	16000	5.78	5.64	22.64	3.20	37.25	6.53	51.29	4.50	11.40	
AIR SEEDERS WITH CULTIVATORS	Life = 15		Annual Hours Use = 150			Annual Repair Rate = 3% Replace Cost						
28'	140	30000	15.32	14.09	28.30	6.00	63.71	11.04	82.25	15.00	5.48	
42'	250	41000	22.11	21.65	38.68	8.20	90.63	14.94	113.07	22.00	5.14	
SPRAYER (TRAILER)	Life = 15		Annual Hours Use = 50			Annual Repair Rate = 3% Replace Cost						
250 Gallon 55'	60	4000	5.78	5.64	11.32	2.40	25.13	6.21	38.85	20.00	1.94	$2.00 per Acre
400 Gallon 65'	60	5000	5.78	5.64	14.15	3.00	28.56	6.45	42.52	25.00	1.70	
SPRAYER (SP)	Life = 10		Annual Hours Use = 100			Annual Repair Rate = 3% Replace Cost						
130 Gallon 54'	60	17000	29.16	5.10			34.26	5.04	46.80	40.00	1.17	$2.00-$2.75 per Acre
1000 Gal 54' Float	160	95000	162.93	28.50			191.43	14.40	213.33	85.00	2.51	
320 Gallon 45' + 3/4 Ton 4x4	60	18000	30.87	5.40			36.27	5.16	48.93	35.00	1.40	

* Full Cost + Profit Basis for Custom Charge. Includes Labor at $7.50 per Hour.

FORAGE EQUIPMENT

Implement	Tractor HP	Current Replace Cost	POWER UNIT OR SP UNIT Fixed Cost	POWER UNIT OR SP UNIT Variable Cost	IMPLEMENT Fixed Cost	IMPLEMENT Variable Cost	TOTAL Machine Cost	Profit Margin 40% (Var Cost + $7.50 Labor)	Full Cost + Profit Basis for Custom Charge *			Market Rate Survey
		$	$/Hr	$/Hr	$/Hr	$/Hr	$/Hr	$/Hr	$/Hr	Ac/Hr	$/Acre	198
SWATHER (SP)	Life = 15		Annual Hours Use = 100				Annual Repair Rate = 3% Replace Cost					
16' Forage & Grain + Conditioner	60	25000	35.38	11.99			47.36	7.79	62.65	7.00	8.95	
20' Grain	60	23000	32.55	11.39			43.93	7.55	58.98	10.00	5.90	
SWATHER (PULL-TYPE)	Life = 15		Annual Hours Use = 100				Annual Repair Rate = 3% Replace Cost					$4 - 7 per Acre
15' Grain	40	5500	4.52	3.66	7.78	1.65	17.61	5.12	30.24	7.50	4.03	
24' Grain	60	6200	5.78	5.64	8.77	1.86	22.05	6.00	35.54	12.00	2.96	
MOWER	Life = 15		Annual Hours Use = 50				Annual Repair Rate = 2% Replace Cost					
7'	40	3300	4.52	3.66	9.34	1.32	18.84	4.99	31.33	3.00	10.44	
MOWER CONDITIONER	Life = 15		Annual Hours Use = 100				Annual Repair Rate = 3% Replace Cost					$8.00-10.00 per Acre
14' SP Diesel	70	35000	49.53	16.14			65.66	9.45	82.61	7.00	11.80	
9' PTO	60	11000	5.78	5.64	15.57	3.30	30.28	6.57	44.35	5.00	8.87	
14' PTO	80	14500	7.54	7.37	20.52	4.35	39.77	7.69	54.96	6.50	8.45	
RAKE	Life = 15		Annual Hours Use = 50				Annual Repair Rate = 2% Replace Cost					
9' Parallel Bar	40	3300	4.52	3.66	9.34	1.32	18.84	4.99	31.33	5.00	6.27	
FORAGE HARVESTER	Life = 12		Annual Hours Use = 100				Annual Repair Rate = 3% Replace Cost					
20"	120	15000	13.82	12.41	23.48	4.50	54.20	9.76	71.47			
26"	180	21000	18.34	17.11	32.87	6.30	74.61	12.36	94.47			
DUMP WAGON	Life = 15		Annual Hours Use = 100				Annual Repair Rate = 2% Replace Cost					$90-160 per Hour
Small (700 cu ft)		7000			9.91	1.40	11.31	.56	11.87			
Large (900 cu ft)		10000			14.15	2.00	16.15	.80	16.95			

* Full Cost + Profit Basis for Custom Charge. Includes Labor at $7.50 per Hour.

FORAGE EQUIPMENT

Implement	Tractor HP	Current Replace Cost	POWER UNIT OR SP UNIT Fixed Cost $/Hr	POWER UNIT OR SP UNIT Var Cost $/Hr	IMPLEMENT Fixed Cost $/Hr	IMPLEMENT Var Cost $/Hr	TOTAL Machine Cost $/Hr	Profit Margin 40%(Var Cost + $7.50 Labor) $/Hr	Full Cost + Profit Basis for Custom Charge * Machine Cost $/Hr	Bale/Hr	$/Bale	Twine Cost $/Bale	Total Cost $/Bale	Market Rate Survey 1983
BALERS (STANDARD)	Life = 10		Annual Hours Use = 80				Annual Repair Rate = 3% Replace Cost							
Small 14" x 18"	40	10500	4.52	3.66	22.51	3.94	34.63	6.04	48.17	+ 200	= .24	+ .08	= .32	$.25-.30 per Bale
Large 16" x 18"	60	13500	5.78	5.64	28.94	5.06	45.42	7.28	60.20	+ 300	= .20	+ .08	= .28	
LARGE ROUND	Life = 12		Annual Hours Use = 60				Annual Repair Rate = 2% Replace Cost							
800 Lb. Bale	60	12000	5.78	5.64	31.30	4.00	46.71	6.85	61.07					$4-5 per Bale
1500 Lb. Bale	60	15000	5.78	5.64	39.13	5.00	55.54	7.25	70.29					
BIG SQUARE	Life = 10		Annual Hours Use = 150				Annual Repair Rate = 3% Replace Cost							
1500-200 Lb.Bale	160	69000	17.08	16.51	78.89	13.80	126.28	15.12	148.91					
BALE WAGONS	Life = 12		Annual Hours Use = 80				Annual Repair Rate = 3% Replace Cost							
SP 160 Bale DS	40	65000	127.16	24.38			151.53	12.75	171.78	+ 400	= .43		.43	$.20-.30 per Bale
PULL 142 Bale	80	28000	7.54	7.37	54.78	10.50	80.18	10.15	97.82	+ 300	= .33		.33	
PULL 104 Bale	60	22000	5.78	5.64	43.04	8.25	62.70	8.55	78.75	+ 240	= .33		.33	
PULL 55 Bale	40	13000	4.52	3.66	25.43	4.88	38.49	6.41	52.40	+ 160	= .33		.33	
STACKERS	Life = 12		Annual Hours Use = 80				Annual Repair Rate = 3% Replace Cost							
4 ton Rectangular	80	20000	7.54	7.37	39.13	7.50	61.53	8.95	77.97					
8 ton Rectangular	120	28000	13.82	12.41	54.78	10.50	91.50	12.16	111.17					

* Full Cost + Profit Basis for Custom Charge. Includes labor at $7.50 per Hour.

COMBINES - SELF PROPELLED (SP) OR PULL TYPE (PTO)

Years Life = 13
Annual Use = 100, 150*, 200 Hours
Annual Repair Rate = 3% Replacement Cost

Combine Cylinder Width	Annual Hours Use	Current Replace Cost	POWER UNIT OR SP UNIT		PTO MACHINE		TOTAL Machine Cost	Profit Margin 40% (Var Cost + $7.50 Labor)	Full Cost + Profit Basis for Custom Charge **			Marke Rate Surve
			Fixed Cost	Variable Cost	Fixed Cost	Variable Cost						
		$	$/Hr	$/Hr	$/Hr	$/Hr	$/Hr	$/Hr	$/Hr	Ac/Hr	$/Acre	198
POWER TAKE OFF	100				63.31		97.93		116.76		19.46	
44-50 IN CYLINDER	150	42000	13.82	12.41	42.20	8.40	76.83	11.32	95.66	6.00	15.94	
(Tractor HP = 120)	200				31.65		66.28		85.10		14.18	
LARGE PTO	100				96.47		144.71		167.17		19.67	
J.D.7721, IHC 1482	150	64000	18.34	17.11	64.31	12.80	112.56	14.96	135.02	8.50	15.88	
(Tractor HP = 180)	200				48.23		96.48		118.94		13.99	
SP DIESEL	100		108.53				130.52		149.81		27.24	
45 INCH	150	72000	72.35	21.99			94.34	11.80	113.64	5.50	20.66	
(HP = 100)	200		54.26				76.25		95.55		17.37	
SP DIESEL	100		132.64				159.90		181.31		27.89	
50 INCH	150	88000	88.43	27.26			115.69	13.90	137.09	6.50	21.09	
(HP = 120)	200		66.32				93.58		114.99		17.69	
SP DIESEL	100		143.19				173.23		195.75		23.03	$12-18
60 INCH	150	95000	95.46	30.04			125.50	15.02	148.02	8.50	17.41	per
(HP = 140)	200		71.60				101.64		124.15		14.61	Acre
ROTARY TYPE	100		132.64				161.28		183.24		26.18	
(SMALL) TR75,	150	88000	88.43	28.64			117.07	14.46	139.02	7.00	19.86	
IHC1440 (HP = 150)	200		66.32				94.96		116.92		16.70	
ROTARY TYPE	100		144.70				175.63		198.50		23.35	
(MEDIUM) IHC1460,	150	96000	96.47	30.93			127.40	15.37	150.27	8.50	17.68	
TR85, ACN6 (HP = 175)	200		72.35				103.28		126.15		14.84	
ROTARY TYPE	100		177.86				214.92		240.24		25.29	
(LARGE) IHC1480,	150	118000	118.57	37.06			155.63	17.82	180.95	9.50	19.05	
TR95, ACN6 (HP = 185)	200		88.93				125.99		151.31		15.93	
ROTARY TYPE	100		188.41				230.66		258.06		24.58	
(LARGEST) ACN7,	150	125000	125.61	42.25			167.86	19.90	195.26	10.50	18.60	
WHITE9700 (HP = 250)	200		94.21				136.46		163.86		15.61	

* The Hour Annual Use figure is typical.

** Full Cost + Profit Basis for Custom Charge includes Labor at $7.50 per Hour.

GRINDERS, MIXERS & DRYERS

plement	Tractor HP	Current Replace Cost	POWER UNIT OR SP UNIT Fixed Cost	POWER UNIT OR SP UNIT Variable Cost	IMPLEMENT Fixed Cost	IMPLEMENT Variable Cost	TOTAL Machine Cost	Profit Margin 40% (Var Cost + $7.50 Labor)	Full Cost + Profit Basis for Custom Charge *			Market Rate Survey
		$	$/Hr	$/Hr	$/Hr	$/Hr	$/Hr	$/Hr	$/Hr	Ac/Hr	$/Acre	1983
BB GRINDER		Life = 12	Annual Hours Use = 80		Annual Repair Rate = 3% Replace Cost							
5 Tons/Hour	80	14000	7.54	7.37	27.39	5.25	47.54	8.05	63.09	15.00	4.21	
5 Tons/Hour	140	22000	15.32	14.09	43.04	8.25	80.70	11.94	100.14	25.00	4.01	
ORTABLE RINDER MIXER		Life = 10	Annual Hours Use = 80		Annual Repair Rate = 3% Replace Cost							
0" Screen	80	9500	7.54	7.37	20.37	3.56	38.83	7.37	53.70			$7-10 per Tonne
4" Screen & Bale Shredder	100	13000	12.56	10.09	27.87	4.88	55.39	8.99	71.88			

RAIN DRYERS	Tractor HP	Current Replace Cost	POWER UNIT OR SP UNIT Fixed Cost	POWER UNIT OR SP UNIT Variable Cost	IMPLEMENT Fixed Cost	IMPLEMENT Variable Cost	TOTAL Machine Cost	Profit Margin 40% (Var Cost + $7.50 Labor)	Full Cost + Profit Basis for Custom Charge *	Moisture Drop 20-14%	Moisture Drop 17.5-14%	Market Rate Survey
		$	$/Hr	$/Hr	$/Hr	$/Hr	$/Hr	$/Hr	$/Hr	$/Tonne	$/Tonne	
RECIRCULATING BATCH		Life = 12	Annual Hours Use = 200		Annual Repair Rate = 3% Replace Cost							
mall (Propane = 37 litres/hr)	40	10500	4.52	3.66	8.22	9.32	25.72	8.19	41.41	31.86 (1.3T/Hr)	20.71 (2.0T/Hr)	
edium (Propane = 46 litres/hr)	40	13000	4.52	3.66	10.17	11.59	29.95	9.10	46.55	26.91 (1.7T/hr)	17.90 (2.6T/Hr)	
arge (Propane = 64 litres/hr)	40	17000	4.52	3.66	13.30	16.13	37.61	10.92	56.03	21.55 (2.6T/Hr)	14.37 (3.9T/Hr)	
ONTINUOUS FLOW												$7-20 per Tonne
mall (Propane = 90 litres/hr)	40	20000	4.52	3.66	15.65	22.68	46.51	13.54	67.55	20.78 (3.3T/Hr)	12.99 (5.2T/Hr)	
edium (Propane = 110 litres/hr)	40	24000	4.52	3.66	18.78	27.72	54.68	15.55	77.73	17.87 (4.4T/Hr)	11.10 (7.0T/Hr)	
arge (Propane = 145 litres/hr)	40	35000	4.52	3.66	27.39	36.54	72.11	19.08	98.69	15.18 (6.5T/Hr)	10.07 (9.8T/Hr)	

* Full Cost + Profit Basis for Custom Charge. Includes Labor at $7.50 per Hour.

FARM TRUCKS

Life = 15 Years
Annual Repair Rate = 3% Replacement Cost

Truck Size	Annual Hours Use	Fuel Use	Current Replace Cost	Fixed Cost	Variable Cost	TOTAL Truck Cost	Profit Margin 40% (Var Costs + $7.50 Labor)	Full Cost + Profit Basis for Custom Charge*	Mark Rat Surv
		litres/Hr	$	$/Hr	$/Hr	$/Hr	$/Hr	$/Hr	19
GENERAL TRUCKING									
2 Ton	150	30.00	19500	18.40	12.65	31.04	8.06	46.60	
	300			9.20		21.84		37.40	
	450			6.13		18.78		34.33	
3 Ton	150	37.00	23000	21.70	15.49	37.19	9.20	53.88	
	300			10.85		26.34		43.04	$5 -
	450			7.23		22.72		39.42	per Tonn (Sho Hau
4 Ton	150	45.00	27000	25.47	18.74	44.21	10.50	62.21	
	300			12.74		31.48		49.47	
	450			8.49		27.23		45.23	
5 Ton Tandom	150	52.00	33000	31.13	21.84	52.97	11.74	72.20	
	300			15.57		37.40		56.64	
	450			10.38		32.21		51.45	

* Full Cost + Profit Basis for Custom Charge. Includes Labor at $7.50 per hour.

POINTS TO CONSIDER IN A CUSTOM HIRING AGREEMENT

Custom hiring is a business arrangement. As in all business arrangements, the agreement should outline the rights and duties of all the parties involved. A written agreement is advisable to avoid misunderstandings in case of a dispute. The following points should be considered in a custom hiring agreement.

1. **Operations:** The agreement should provide a description of the exact operations to be performed by the parties and the machines, materials and labor to be supplied by each party.

2. **Timeliness:** Significant losses can occur if an operation is not started or completed on time. To facilitate planning, a custom hiring agreement should include a schedule of operations for both parties. Such a schedule would be subject to weather conditions and crop maturity. Reasonable notice should be provided by each party when circumstances alter the schedule for operations.

3. **Rate Schedule:** The custom operator, for each operation to be performed, should stipulate his rate on the basis of acreage, time (week, day, hour) or total operation performed.

4. **Payment:** The agreement should stipulate the terms of payment for custom operations. The custom operator should bill the client on completion of each custom operation indicating the actual units (acres, hours, etc.) completed, the rate charged per unit, the total charge and the due date for payments.

5. **Down-Time:** The parties should consider a clause in the agreement, regarding responsibility for down-time as a result of machine breakdown.

6. **Termination:** The agreement should include a clause for a minimum period of notice for termination. A penalty should be stated for unjustified termination of the agreement.

7. **Liability:** The parties should consider a clause stipulating the responsibility for liability claims as a result of damage to personal property.

8. **Management:** The custom agreement should secure provisions that the custom operator will employ acceptable management practices in his operations.

For additional information and sample agreements for the above, refer to the publication "Custom Farming Agreement", Alberta Agriculture, Agdex 817-10.

MACHINERY COST WORKSHEET

Machine.....**Original Cost**.....**Annual Hours of Use**.....

Replacement Cost .....**Sale Value**.....**Years of Use**.....

			Yearly Cost	Hourly Cost
FIXED COSTS (Calculated on Yearly Basis)				
1. Depreciation	= $\frac{\text{Replacement Cost - Cash Sale Value}}{\text{Years of Use}}$	$\frac{\$\ldots\ldots - \$\ldots\ldots}{\ldots\ldots\text{Years}}$	$ _____	
2. Investment Cost	= $\frac{\text{Original Cash Cost + Cash Sale Value}}{2}$ X Interest Rate	$\frac{\$\ldots\ldots + \$\ldots\ldots}{2}$ X .....%	$ _____	
3. Insurance & Housing	= Original Cash Cost X 1%	$..... X .....%	$ _____	
4. TOTAL FIXED COSTS PER YEAR			$ ═══ (A)	
5. TOTAL FIXED COSTS/HOUR	= Total Costs/Year/Hours of Annual Use	$..... ÷ $.....hr		$ ═══ (B)
VARIABLE COSTS (Calculated on Hourly Basis) (use following formulas if actual costs are not known)				
1. Fuel Cost	= Litre/Hour X Price/Litre	..... X $..... X	$ _____	
2. Lubrication	= Fuel Cost X 15%	$..... X .....%	$ _____	
3. Repairs	= $\frac{\text{Original Purchase Price X Annual Repair Rate}}{\text{Hours of Annual Use}}$	$\frac{\$\ldots\ldots X \ldots\ldots\%}{\ldots\ldots\text{hrs}}$		$ _____
4. TOTAL VARIABLE COSTS PER HOUR				$ ═══ (C)
5. TOTAL VARIABLE COSTS PER YEAR	= Total Variable Costs/Hour X Hours of Annual Use	$..... X .....hr	$ ═══ (D)	

TOTAL COSTS PER YEAR (A+D) = $..... + $..... $ _____

TOTAL COSTS PER HOUR (B+C) = $..... + $..... $ _____

MACHINERY CUSTOM CHARGE WORKSHEET[1]

Operation ..... Power Unit ..... Implement(s) ..... Acres/Hour .....

	Power Unit	Machine 1	Machine 2
FIXED COSTS PER HOUR[2]			
A. Depreciation	$ _____	$ _____	$ _____
B. Investment Cost	$ _____	$ _____	$ _____
C. Insurance & Housing	$ _____	$ _____	$ _____
D. Total Fixed Cost (A+B+C)	$ _____ (P)	$ _____ (R)	$ _____ (S)
E. Total Fixed Machine(s) Costs (P+R+S)			$ _____ (E)
VARIABLE COSTS PER HOUR[3]			
F. Fuel Cost	$ _____		
G. Lubrication	$ _____	$ _____	$ _____
H. Repairs	$ _____	$ _____	$ _____
I. Total Variable Cost (F+G+H)	$ _____ (T)	$ _____ (U)	$ _____ (V)
J. Total Variable Machine Cost (T+U+V)			$ _____ (J)
K. TOTAL MACHINE COST PER HOUR (E+J)		$ _____ (K)	
L. LABOR COST PER HOUR		$ _____ (L)	
M. PROFIT MARGIN (20-50% of Variable Cost + Labor)		$ _____ (M)	
N. FULL COST + PROFIT (K+L+M)		$ _____ (N)	
O. TOTAL CHARGE/ACRE (N ÷ Acres/Hour)		$ _____	

1 Before using this worksheet, calculate the costs of each machine using the "Machinery Cost Worksheet".
2 Refer to Machinery Cost Worksheet and divide by annual hours of use.
3 Refer to Machinery Cost Worksheet.

FUEL CONSUMPTION FOR VARYING TRACTOR HORSEPOWER[1]

TRACTOR TYPE AND SIZE	AVERAGE DRAWBAR HORSEPOWER[2]		AV. FUEL CONSUMPTION[3] (Litres per Hour)	
	Diesel Tractors	Gasoline Tractors	Diesel Tractors	Gasoline Tractors
Two Wheel Drive PTO HP				
30 - 39	....	31.5	....	10.5
40 - 49	....	38.3	....	12.3
50 - 59	48.2	47.1	10.5	15.0
60 - 69	56.2	55.2	13.6	20.0
70 - 79	65.5	64.5	16.4	23.2
89 - 89	73.5	74.5	17.7	26.8
90 - 99	84.0	82.0	20.5	28.2
100 - 119	90.3	....	22.7	....
120 - 139	111.6	....	28.2	....
140 - 159	128.9	....	32.3	....
160 - 179	145.8	....	38.6	....
Over 180	148.9	....	39.1	....
Four Wheel Drive DBHP				
100 - 149	135.0	....	33.2	....
150 - 174	159.4	....	40.3	....
175 - 199	182.8	....	50.0	....
200 - 224	217.4	....	53.0	....
225 - 249	235.5	....	58.0	....
250 - 274	265.0	....	61.4	....
275 - 299	281.3	....	62.6	....
300 - 349 *	305.0	....	66.4	....
Over 350 *	385.0	....	92.4	....

* Includes only one tractor

NOTES ON FUEL CONSUMPTION TABLE

This data on fuel consumption for different sizes of tractors was calculated from the Nebraska Tractor Tests Reports. The fuel consumption figures are based on "75% of Pull at Maximum Power". These fuel consumption figures are for tractors under normal load in average field conditions. Fuel use per hour will be affected by:-

- load factor (75% is assumed in these estimates
- engine RPM
- gear
- correct engine tuning

While these figures may be a good indication of fuel use per hour for a machine, fuel consumption per acre will be affected by the Field Efficiency related to each operation. Estimation of total fuel consumption should take this factor into account. Some factors that can significantly affect field efficiency include:-

- wheel slippage
- tire pressure
- tractor ballast
- depth of and sharpness of implement
- soil type and condition
- amount of turning required
- implement overlap in each pass
- down time to refill seed and fertiliser boxes

1 This data was summarized from "Nebraska Tractor Test Summary 1972 through 1981", The Grain Grower, Page 762 (UGG), April, 1982 and from 1980 - 1981, Agricultural Yearbook, A.S.A.E, May, 1980, pp 537-545.
2 Average Drawbar Horsepower for all tractors in each range.
3 Average fuel consumption for all tractors in each range.

MACHINERY COSTS ASSUMPTION GUIDE

MACHINE	A Depreciation Lifetime (Years)	B Annual Use (Hours)	C Annual Repair rate % orig.Cost	D Lifetime Repairs % orig.Cost	E Field Efficiency
Tractors	13	600	3%	120%	.....
Combines	12	150	3%	60%	60 - 80%
Cultivators	15	250	3-8%	120%	70 - 90%
Discers	15	150	3%	120%	70 - 90%
Rodweeders	15	100	2%	100%	70 - 90%
Seed Drills	15	100	2%	100%	65 - 80%
Harrows, Packers	15	40	2%	120%	70 - 90%
Sprayers	15	50	2%	80%	50 - 80%
Stone Pickers	15	40	2%	100%	50 - 80%
Swathers	15	100	3%	95%	70 - 85%
Mowers & Rakes	15	50	2%	100%	60 - 90%
Mower-Condtioner	15	50	2%	100%	60 - 85%
Forage Harvester	15	80	3%	80%	50 - 80%
Balers					
Standard	10	80	3%	80%	60 - 85%
Large Round	12	60	2%	60	60 - 85%
Grain Dryers	12	200	3%	...	.....
Loaders	15	40	2%	90%	.....

NOTES ON COLUMN HEADINGS

A. Estimated average number of years until a machine depreciates to 10% of original cash cost.

B. Estimated average annual farm use.

C. Estimates are based on average conditions and the indicated annual hours of use.

D. Total repairs as a percent of the original cash cost. Repairs are usually low in the first years before they begin to increase at an increasing rate as the machine wears out. These figures could be viewed as a maximum since they reflect high rates in later years.

E. Field Efficiency is a percentage estimate of the amount of time machinery is actually in use relative to the total time required to complete an operation (refer also opposite page).

ACRES PER HOUR

Acres per hour (or "Effective Field Capacity") can be calculated using the following formula:-

$$\text{Acres per hour (Effective field Capacity)} = \frac{\text{machine width (ft)} \times \text{speed (mph)} \times \text{field efficiency}}{8.25}$$

E.G. A 31' cultivator travelling at 5 m.p.h. operating at 80% field efficiency would have an effective field capacity of:-

$$\text{Acres per hour} = \frac{31 \times 5 \times .80}{8.25} = 15 \text{ ac/hr}$$

"MY EQUIPMENT COSTS"[1]

MACHINE TYPE	FIXED COSTS		VARIABLE COSTS		TOTAL COSTS Per Hour	LABOR Per Hour	PROFIT MARGIN Per Hour	FULL COST + PROFIT Per Hour
	Total	Per Hour	Total	Per Hour				

[1] Costs for your own equipment can be calculated using the Worksheet on page 13.

METRIC CONVERSION TABLE

1 hectare (ha)	=	2.5 acres
1 kilometre (km)	=	0.625 miles
1 metre (m)	=	3.3 feet
1 centimetre (cm)	=	0.39 inches
1 kilogram (km)	=	2.2 pounds
1 tonne (t)	=	1.1 tons or 2200 pounds
1 tonne (t)	=	36.7 bu. of wheat
	=	45.9 bu. of barley
	=	64.8 bu. of oats
	=	44.1 bu. of rapeseed
1 litre (l)	=	0.22 gallons
1 kilowatt (kw)	=	1.34 horsepower
1 acre	=	.4 hectares
1 mile	=	1.6 kilometres
1 foot	=	.3 metres
1 inch	=	2.5 centimetres
1 pound	=	.45 kilograms
1 ton	=	.91 tonnes
1 bu. of wheat	=	27.3 kilograms
1 bu. of barley	=	21.8 kilograms
1 bu. of oats	=	15.5 kilograms
1 bu. of rapeseed	=	22.7 kilograms
1 horsepower	=	.75 kilowatts

1 kilogram per hectare = 0.9 pounds per acre (approximately)

1 pound per acre = 1.1 kilograms per hectare (approximately)

If a fertilizer recommendation is given in kilograms per hectare and the machine is calibrated in pounds per acre, set the machine at 10% less than the recommendation to obtain the desired rate.